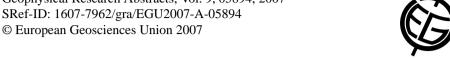
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Dating microstructures by the 40Ar/39Ar step-heating technique: implications for the evoution of plate margins

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White micas from the Penninic units of the Western Alps have been dated by the ⁴⁰Ar/³⁹Ar step-heating method in order to understand the time scales involved with the evolution of the Alpine orogen. Structural studies have shown that the Western Alps underwent two shortening-extension cycles in the Eocene-Oligocene . Crystallization of phengitic mica in eclogite facies conditions during an early shortening event took place at 50-44 Ma. A major deformation-recrystallization event in greenschist facies conditions (D₂) culminated in the formation of muscovitic mica at ca. 42-40 Ma. Muscovites are found along shear fabrics associated with extensional shear zones that accommodated fast exhumation and cooling of the studied units. Folding of the shear-related structures during renewed shortening deformation (D₃) resulted in the formation of pervasive axial planar cleavage in micaschists after ca. 36.5 ± 0.5 Ma. Therefore, the evolution of the Western Alps, which are located along the Africa-Europe convergent margin, was characterized by multiple episodes of shortening and extensional deformation. A duration of less that 5 Myr can be postulated for each of those episodes.